

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
30 November 2000 (30.11.2000)

PCT

(10) International Publication Number
WO 00/70941 A1

(51) International Patent Classification⁷: A01K 29/00, 1/00

Karel [NL/NL]; Boterbloemstraat 5, NL-2971 BR
Bleskensgraaf (NL).

(21) International Application Number: PCT/NL00/00308

(22) International Filing Date: 10 May 2000 (10.05.2000)

(74) Agent: CORTEN, Maurice, Jean, F., M.; Weverskade 10,
NL-3155 PD Maasland (NL).

(25) Filing Language: English

(81) Designated States (*national*): AU, CA, JP, US.

(26) Publication Language: English

(84) Designated States (*regional*): European patent (AT, BE,
CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,
NL, PT, SE).

(30) Priority Data:
1012137 25 May 1999 (25.05.1999) NL

(71) Applicant (*for all designated States except US*): LELY
RESEARCH HOLDING AG [CH/CH]; Bützenweg 20,
CH-6300 Zug (CH).

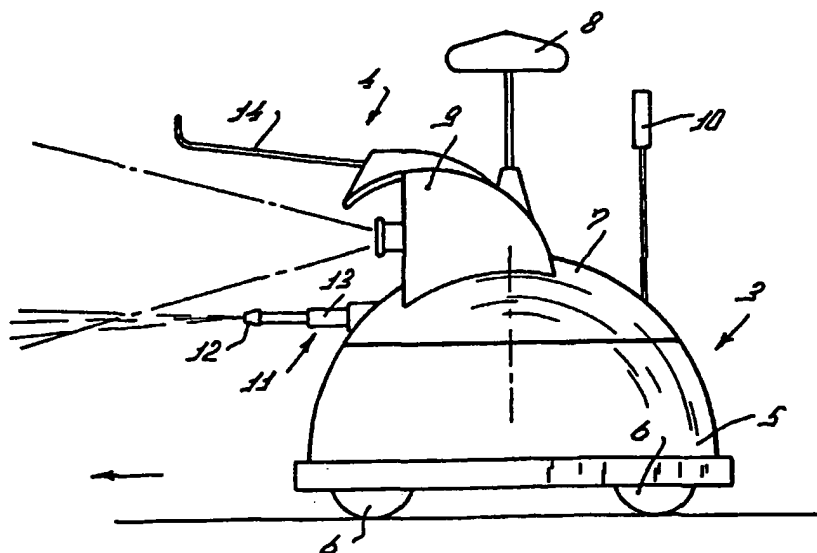
Published:
— With international search report.

(72) Inventor; and

(75) Inventor/Applicant (*for US only*): VAN DEN BERG,

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: AN UNMANNED VEHICLE TO BE USED IN A STABLE OR A MEADOW



(57) Abstract: The invention relates to an unmanned vehicle to be used in a stable (1), such as e.g. a cowshed, or in a meadow. The unmanned vehicle (3) is provided with detection means (4) for determining the health and/or the behaviour of animals. The detection means (4) comprise an animal identification system and/or a radar (8) and/or a camera (9). The unmanned vehicle (3) is further provided with driving means (14) for driving animals. On the unmanned vehicle (3) there are further provided disinfecting means (11) for disinfecting at least a part of the stable (1) and/or a part of an animal.



WO 00/70941 A1

AN UNMANNED VEHICLE TO BE USED IN A STABLE OR A MEADOW

The invention relates to an unmanned vehicle to be used in a stable, such as e.g. a cowshed, or in a meadow.

5 Such a vehicle is known.

The known vehicle is usually employed for cleaning the stable floor.

It is an objective of the invention to provide a multifunctional, unmanned vehicle.

10 In accordance with the invention, this is achieved in that the unmanned vehicle is provided with detection means for determining the health and/or the behaviour of animals. With the aid of its detection means the unmanned vehicle is capable of identifying animals which are ill and/or display abnormal
15 behaviour. According to an inventive feature, the unmanned vehicle comprises alarm means for alarming a supervisor when an animal is ill or displays abnormal behaviour. In this manner it is possible to react quickly and adequately when there is something wrong with an animal.

20 According to a further inventive feature, the detection means comprise an animal identification system provided with a transmitter and a receiver. By means of the animal identification system there is determined for example whether an animal is lying or standing longer than usually at
25 a certain place. This may be an indication that the animal is ill. According to another inventive feature, the animal identification system comprises a radar as well as reflectors reacting on the radar, which are disposed on the animals. Each of these reflectors has a unique code, so that it is possible
30 to determine per animal how the animal is moving. In this manner it is also possible to determine abnormal behaviour of the animals. According to another inventive feature, the detection means comprise a camera, preferably constituted by an infrared camera. By means of image analysis of the images
35 of the animals recorded by the camera it is possible for example to determine whether an animal has mastitis or is injured or has to be inseminated. It is also possible to track the animals by means of the camera. For enabling a still

better view of the animals, the detection means are disposed on a telescopic carrier. According to again another inventive feature, the unmanned vehicle comprises driving means for driving the animals. With the aid of the driving means animals
5 can be separated from a group, e.g. for the purpose of being inseminated or examined by a veterinary surgeon. In a preferred embodiment of the invention, the driving means comprise an electric shock device.

According to another aspect of the invention, the
10 unmanned vehicle comprises disinfecting means for disinfecting at least a part of the stable and/or a part of an animal. According to again another aspect of the invention, the disinfecting means are disposed on a telescopic carrier. The latter measure makes it possible to disinfect at places which
15 are difficult to reach. For the purpose of rendering the unmanned vehicle still more multifunctional, it is provided with a manure slide for removing manure which is lying on a floor. According to another inventive feature, the unmanned vehicle is provided with navigation means for guiding the
20 unmanned vehicle through the stable or the meadow. The navigation means may be the same as the above-described detection means.

The invention will now be explained in further detail
25 with reference to the accompanying drawings.

Figure 1 is a plan view of a stable with an unmanned vehicle accommodated therein, which vehicle is provided with detection means according to the invention, and

Figure 2 is a side view of the unmanned vehicle shown
30 in Figure 1.

Figure 1 is a plan view of a stable 1 provided with a milking robot 2 for automatically milking animals and an unmanned vehicle 3 which is provided with detection means 4
35 for determining the health and/or the behaviour of animals.

Figure 2 is a side view of the unmanned vehicle 3 according to the invention, which is provided with a chassis 5

with wheels 6. The wheels 6 are driven by a (non-shown) drive unit. On the chassis 5 there is disposed a rotatable upper part 7 on which the detection means 4 are mounted. In the present embodiment the detection means 4 comprise a radar 8 and a camera 9. The unmanned vehicle 3 is further provided with a transmitter unit including a transmitting element 10. By means of the transmitter unit the supervisor can be alarmed when an animal is ill and/or displays abnormal behaviour. On the rotatable upper part 7 there are further disposed disinfecting means 11 for disinfecting at least a part of the stable and/or at least a part of an animal. In the present embodiment the disinfecting means 11 comprise a sprayer 12 which is disposed on a telescopic carrier 13.

On the rotatable upper part 7 there are further disposed driving means 14 for driving animals. The driving means 14 are fitted to the upper side of the camera 9. The driving means 14 are connected to an electric shock device which is capable of emitting a pulse.

In the present embodiment the camera 9 is used to guide the unmanned vehicle through the stable and/or the meadow.

CLAIMS

1. An unmanned vehicle to be used in a stable (1), such as e.g. a cowshed, or in a meadow, characterized in that the
5 unmanned vehicle (3) is provided with detection means (4) for determining the health and/or the behaviour of animals.
2. An unmanned vehicle as claimed in claim 1, characterized in that the detection means (4) comprise an animal identification system.
- 10 3. An unmanned vehicle as claimed in claim 2, characterized in that the animal identification system comprises a transmitter and a receiver.
4. An unmanned vehicle as claimed in claim 2, characterized in that the animal identification system
15 comprises a radar (8) as well as reflectors reacting to the radar.
5. An unmanned vehicle as claimed in claim 2, characterized in that the detection means comprise a camera (9).
- 20 6. An unmanned vehicle as claimed in claim 5, characterized in that the camera (9) is constituted by an infrared camera.
7. An unmanned vehicle as claimed in any one of the preceding claims, characterized in that the detection means
25 (4) are disposed on a telescopic carrier.
8. An unmanned vehicle as claimed in any one of the preceding claims, characterized in that the unmanned vehicle (3) is provided with driving means (14) for driving animals.
9. An unmanned vehicle as claimed in claim 8,
30 characterized in that the driving means (14) comprise an electric shock device.
10. An unmanned vehicle as claimed in any one of the preceding claims, characterized in that the unmanned vehicle (3) comprises disinfecting means (11) for disinfecting at
35 least a part of the stable (1) and/or a part of an animal.

11. An unmanned vehicle as claimed in claim 10, characterized in that the disinfecting means (11) are disposed on a telescopic carrier (13).
12. An unmanned vehicle as claimed in any one of the
5 preceding claims, characterized in that the unmanned vehicle (3) is provided with a manure slide for removing manure which is lying on a floor.
13. An unmanned vehicle as claimed in any one of the
10 preceding claims, characterized in that the unmanned vehicle (3) comprises alarm means for alarming a supervisor when an animal is ill or displays abnormal behaviour.
14. An unmanned vehicle as claimed in any one of the
15 preceding claims, characterized in that the unmanned vehicle (3) is provided with navigation means for guiding the unmanned vehicle through the stable or the meadow.
15. An unmanned vehicle as claimed in any one of the preceding claims, characterized in that the unmanned vehicle (3) comprises a rotatable upper part (7) on which the detection means (4) are disposed.

1/1

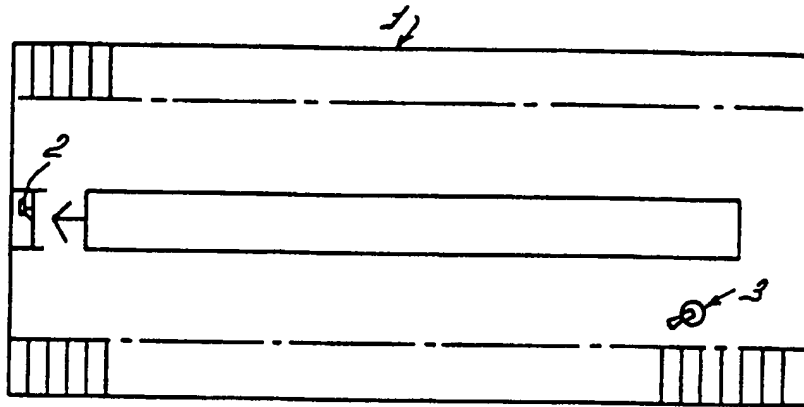


FIG. 1

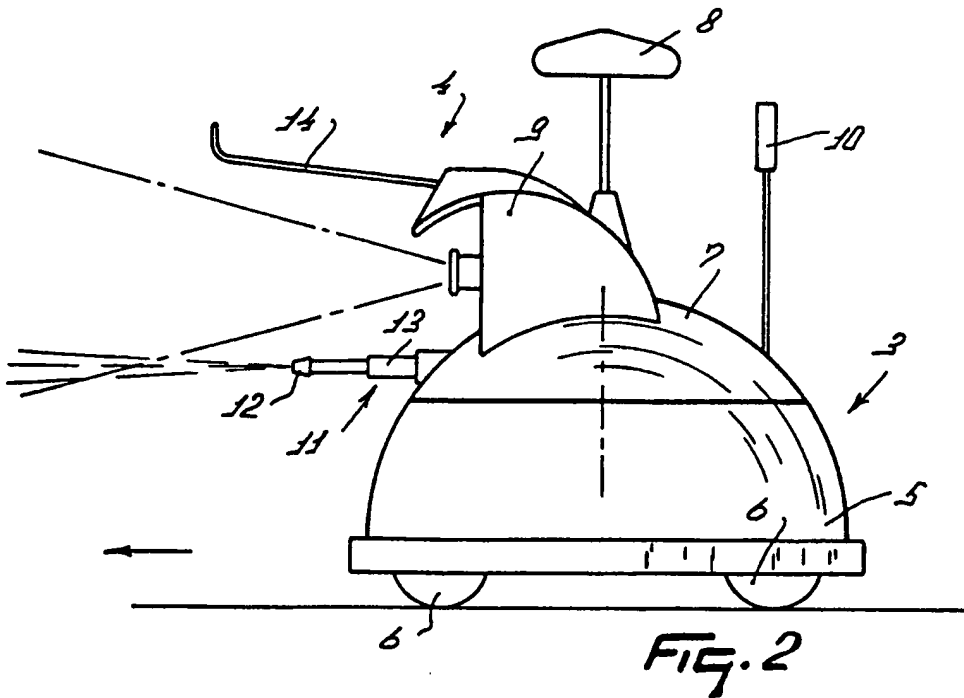


FIG. 2

INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 00/00308

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A01K29/00 A01K1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A01K B25J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|-----------------------|
| X | WO 96 14735 A (MAASLAND N.V.) 23 May 1996 (1996-05-23) | 1, 13, 14 |
| A | page 8, line 30 -page 9, line 11; figures 1, 2 | 4-7 |
| X | US 5 474 085 A (HURNIK) 12 December 1995 (1995-12-12) the whole document | 1, 5, 6, 13 |
| A | FR 2 586 223 A (TROUVE) 20 February 1987 (1987-02-20) the whole document | 1 |
| | -/-- | |

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

27 July 2000

Date of mailing of the international search report

04/08/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040. Tx. 31 651 epo nl,
Fax: (+31-70) 340-3018

Authorized officer

von Arx, V.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 00/00308

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|-----------------------|
| A | PATENT ABSTRACTS OF JAPAN vol. 16, no. 120 (E-1182), 26 March 1992 (1992-03-26) & JP 03 289310 A (TOSHIBA CORP.), 19 December 1991 (1991-12-19) abstract ----- | 1,4-7 |
| A | WO 98 47351 A (AVID IDENTIFICATION SYSTEMS, INC.) 29 October 1998 (1998-10-29) the whole document ----- | 2,3,13 |
| A | WO 97 31524 A (MAASLAND N.V.) 4 September 1997 (1997-09-04) ----- | |
| A | DE 29 09 325 A (HECHT) 11 September 1980 (1980-09-11) ----- | |
| A | US 5 832 868 A (OOSTERLING) 10 November 1998 (1998-11-10) ----- | |

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/NL 00/00308

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---------------------|--|--|
| WO 9614735 A | 23-05-1996 | NL 9401876 A EP 0739161 A JP 9507761 T US 5816192 A | 03-06-1996 30-10-1996 12-08-1997 06-10-1998 |
| US 5474085 A | 12-12-1995 | AU 1703895 A CA 2183232 A WO 9523336 A | 11-09-1995 31-08-1995 31-08-1995 |
| FR 2586223 A | 20-02-1987 | NONE | |
| JP 03289310 A | 19-12-1991 | NONE | |
| WO 9847351 A | 29-10-1998 | US 6012415 A AU 6577998 A AU 7250998 A EP 1009224 A EP 0977478 A WO 9847350 A | 11-01-2000 13-11-1998 13-11-1998 21-06-2000 09-02-2000 29-10-1998 |
| WO 9731524 A | 04-09-1997 | NL 1002487 C AT 193180 T AU 712994 B AU 1736897 A DE 69702097 D EP 0822743 A JP 11504526 T US 5983833 A | 01-09-1997 15-06-2000 18-11-1999 16-09-1997 29-06-2000 11-02-1998 27-04-1999 16-11-1999 |
| DE 2909325 A | 11-09-1980 | DE 3027825 A | 04-03-1982 |
| US 5832868 A | 10-11-1998 | NL 9300443 A DE 69406911 D DE 69406911 T EP 0688162 A WO 9419931 A | 03-10-1994 02-01-1998 19-03-1998 27-12-1995 15-09-1994 |